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SCHEDULE OF MEETINGS

8-20 August	**International Conference on the Peaceful Uses of Atomic Energy, Geneva**
14-27 August	**Seminar on Sewage Disposal, Kandy, Ceylon**
29 August-2 September	**Consultant Group on Medical Requirements for the Licensing of Motor Vehicle Drivers, Geneva**
29 August-3 September	**Expert Committee on Psychiatric Nursing, first session, Geneva**
5-8 September	**Regional Committee for Europe, fifth session, Vienna**
5-10 September	**Regional Committee for South-East Asia, eighth session, Bandung**
6-8 September	**PASO Executive Committee, twenty-sixth meeting, Washington, D.C.**
7-14 September	**Expert Committee on Trachoma, second session, Geneva**
9-21 September	**PASO Directing Council, eighth meeting ; WHO Regional Committee for the Americas, seventh session, Washington, D. C.**
12-16 September	**Regional Committee for the Eastern Mediterranean, fifth session, Beirut**
13-19 September	**Regional Committee for the Western Pacific, sixth session, Singapore**
19-24 September	**WHO/FAO Joint Conference on Food Additives, Geneva**
19-24 September	**Regional Committee for Africa, fifth session, Madagascar**
21 September	**PASO Executive Committee, twenty-seventh meeting, Washington, D.C.**
26 September-1 October	**Expert Committee on Drugs Liable to Produce Addiction, sixth session, Geneva**

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INFANT NUTRITION IN THE SUBTROPICS AND TROPICS

In any part of the world, practices in infant feeding are one of the most important factors in determining the health of the whole population. Nowhere is this more apparent than in the technically underdeveloped countries of the subtropical and tropical regions, where ignorance and superstition often vie with poverty and lack of suitable food in producing widespread malnutrition among infants and children.

This widespread malnutrition is a basic and increasingly urgent problem in efforts to raise the standards of health and living of the less-developed countries. It is a problem with many concomitants, requiring study along sociological as well as medical lines. Assistance from outside sources may complicate rather than help the situation : old beliefs may be shaken and practices eliminated without adequate attention being given to assuring the continuity of new and more healthful substitutes. Any attempt to improve infant nutrition must be based on familiarity with local conditions and customs, and means must be found to adapt present-day knowledge of healthful infant-feeding methods to the circumstances in the less-developed countries of the subtropics and tropics. As Dr D. B. Jelliffe, WHO Nutrition Consultant, has written, ". . . it is useless to expect the standard Western-style textbook instructions on infant feeding to have any significance for most children in these parts of the world, who easily form the numerical majority of the global child population ".

Dr Jelliffe, WHO Visiting Professor of Paediatrics at the All-India Institute of Hygiene and Public Health, and former Senior Lecturer in Paediatrics at the University College of the West Indies, undertook on behalf of WHO a three-month survey of methods of infant feeding in the Eastern Mediterranean, South-East Asia, and Western Pacific Regions. On the basis of this survey, previous personal experience in the Sudan, Nigeria, and Jamaica, and a review of the pertinent literature, he prepared a study, which is soon to appear in the WHO *Monograph Series*,[1] on infant nutrition in the subtropics and tropics. The information that follows is drawn from Dr Jelliffe's book, in which he first describes infant-feeding practices and common nutritional diseases in a number of subtropical and tropical countries and then suggests practical approaches to improvement.

INFANT-FEEDING PRACTICES IN THE SUBTROPICS AND TROPICS

There is infinite variety in methods of infant feeding in the subtropics and tropics; uniformity is not to be found even within a country, district, or town, since socio-economic as well as racial and religious differences play a part in how and what an infant may be fed. A summary picture of nutritional practices and diseases in some of the countries in the regions under study is given in table I.

Certain common practices may be noted, chief among them being prolonged breast-feeding, especially among the poorer population groups. The main reason for discontinuation of breast-feeding is another pregnancy, and in many countries breast-feeding is usually prolonged because of the belief that it prevents a new conception.

In general, animal milks play little part in the feeding of the majority of poorer infants

[1] Jelliffe, D. B. (1955) *Infant nutrition in the subtropics and tropics*, Geneva (*World Health Organization : Monograph Series*, No. 29).

TABLE I. INFANT-FEEDING PRACTICES

Countries or territories	Usual weaning age	Age at which semi-solids are begun	Use of animal milk	Common semi-solids	Common nutritional disorders
Egypt	18-24 months	9-12 months	Buffalo milk available but not consumed	Combinations of maize with other ingredients, legumes	Anaemia, rickets, kwashiorkor, avitaminosis A
Lebanon and Syria	12-24 months	12 months	Some milk (cow or goat) used in villages, usually in curdled form	Cereals (wheat, maize) and dried chick peas, often prepared with sour milk	Anaemia, marasmus, rickets
Iraq	18-24 months	6-12 months	Fat-free or sour milk (sheep, cow, buffalo, goat, camel) commonly used	Some cereals, herbs, and bits from family fare; weaning foods difficult to find	
Northern Sudan	Boys: 18-24 months Girls: 24-30 months	Some supplementary food from 2 months	Milk sometimes given in sweetened tea	Cooked sheep's tail, sweet potato, cooked dried meat, premasticated adult fare	
Saudi Arabia	24 months	Early months		Butter, paste of almonds or other nuts with honey	
Morocco					
Jews	Gradual weaning		Milk used	Cheese, fish, meat, soup	
Coast Arabs	Sudden weaning		Practically no milk used	Indigestible diet of bread, bread paste fried in oil, mint tea	Kwashiorkor
Berbers			Soured milk common	Goat meat	General malnutrition
Heratines				Barley biscuits and dates	Kwashiorkor
Algeria	24 months or older			Potatoes, bread, biscuits, oil, fruit and vegetables occasionally	
Pakistan	24 months or older	About 12 months	Buffalo and goat milk used	Some cereal preparations: adult food such as wheat pancakes dipped in curry	Anaemia, marasmus, rickets
India	24-36 months	7-12 months	Cow, buffalo, goat, and sometimes sheep milk used	Cereal preparations, banana gruel, rice gruel, grams; family diet	Anaemia, avitaminosis A, marasmus, protein-deficiency syndromes; rickets in some areas
Ceylon		6 months	Cow and buffalo milk used among Hindus	Rice gruel, curry	Anaemia, avitaminosis A, marasmus, protein-deficiency syndromes
Burma	Prolonged	3-12 months	Traditional dislike of milk	Rice, family fare	Anaemia, marasmus, beriberi, kwashiorkor
Thailand	Prolonged	Very early	Not used to any extent	Rice, mashed banana	Avitaminosis A, beriberi
Indo-China	18-24 months	Very early		Rice, dried fish, small quantities of fruit and condiments	Kwashiorkor

TABLE I. INFANT-FEEDING PRACTICES (Concluded)

Countries or territories	Usual weaning age	Age at which semi-solids are begun	Use of animal milk	Common semi-solids	Common nutritional disorders
Malaya	Variations according to racial group	Very early	Sweetened condensed milk	Excess of carbohydrate; sugar and rice	General malnutrition, endemic goitre, kwashiorkor (except among Indians)
Indonesia	12-24 months	Very early		Rice, bananas, soya beans	Avitaminosis A, anaemia, kwashiorkor
Philippines	Prolonged		Diluted condensed milk sometimes used	Rice and banana gruel, sweet potato, fish	Beriberi, anaemia, marasmus, avitaminosis A, kwashiorkor
China	12-36 months	From 5 months	Not common in most areas, except northern China (goat milk) and Tibet (yak milk)	Gruels, rice, soups, eggs, red dates	
Pacific territories	18-24 months	Early	Sweetened condensed milk in some areas	Premasticated root vegetables (taro, sweet potato, etc.)	
Jamaica	7-9 months	Early	Sweetened condensed milk for flavouring	Partial feeding with cornmeal porridge mixed with sweetened condensed milk and sugar; gruels, carbohydrates, root vegetables, carrot juice (sometimes to excess)	Kwashiorkor, marasmus, anaemia
Panama	6-9 months			Maize, beans, wheat	Protein deficiency
Brazil	12 months	2-3 months	Very little used	Paps, bean and vegetable soups, cassava; wide variety of foods, depending on area	Widespread malnutrition, including some kwashiorkor and marasmus
Peru	12-30 months	6 months		Variety of foods, including soups, porridges, sweet potatoes, bananas, and family diet, usually unsuitable for infants	
Central America	Variable	4 months		Rice and other gruels, pumpkin, potatoes, bread, bean soup	
West Africa	Generally prolonged			Some gruels, beans, some fruit, bits from adult diet	Anaemia, marasmus, kwashiorkor
Central Africa	Generally prolonged			Manioc, millet gruel, bananas, sweet potato, cassava; bits from adult fare	Anaemia, marasmus, kwashiorkor
East Africa	Usually prolonged	Early	Some cow's milk among the Masai	Bananas, yams, maize and millet gruels	Anaemia, marasmus, kwashiorkor

in the subtropics and tropics. When fresh milk is used, it is nearly always greatly adulterated. Sweetened condensed milk is employed in some areas, especially in towns, because of its keeping qualities; but its principal purpose is for flavouring rather than for its nutritional value.

Eggs seem to be the object of more prejudices and superstitions than any other food and are little used in infant feeding.

Although semi-solids are introduced very early in certain areas (e.g., in Malaya and some adjacent countries, where rice is given in the first days or weeks of life), usually they are begun between the sixth and twelfth month, with many variations from one place to another, as table I indicates. Frequently the change to an almost adult diet is abrupt. Nearly always the infant is given the softest starchy portion of the adult diet as his first food, and this may be very unsuitable and indigestible. There is a tendency to keep the infant on a single, monotonous, predominantly carbohydrate food, even if other foods are available.

NUTRITIONAL DISEASES

Many infants in the subtropics and tropics start life with a nutritional handicap ; birthweights are generally low because of the malnutrition of the mothers. The rate of growth of the infant is often satisfactory during the first six months or so, when breast milk is abundant and adequate for the infant's needs; but from that point on there is a deterioration, largely because of the mother's inability to meet the increasing nutritional requirements. The infant becomes subject to a host of nutritional disorders, owing principally to the difficulty of obtaining suitable weaning foods, especially those containing essential protein.

Nutritional anaemia

" Hypochromic iron-deficiency anaemia ('suckling anaemia') is common during infancy all over the world and in most of the subtropics and tropics is so widespread as to be almost universal.... The importance of the disease as a debilitating factor cannot be overestimated."

Iron deficiency often has its origin in intrauterine life. Normally the foetus receives 300-500 mg of iron from the mother during foetal life, via the placenta from the maternal serum iron. If, as often happens, the poorly nourished mother is unable to provide the necessary stores of iron for the foetus, the newborn infant has to draw upon dietary sources for additional haemoglobin formation during the ensuing months of rapid growth; and, since his diet is usually limited to milk, which is low in iron content, a deficiency of iron results. Another factor which may play a part in this deficiency is poor absorption, caused by a variety of different conditions such as chronic gastroenteritis, changes in the intestinal epithelium in malnutritional states such as kwashiorkor, and the presence of severe ascariasis or any infection which produces a transient hypochlorhydria.

Other nutritional deficiencies may also contribute to anaemia in infancy in the tropics—e.g., lack of protein of good biological value, or, possibly, of ascorbic acid.

Avitaminosis A

Avitaminosis A is prevalent in some tropical areas, especially in South-East Asia. It is rampant in India and Indonesia; and 60% of the blindness in Ceylon is estimated to be the result of earlier keratomalacia associated with vitamin-A deficiency.

The effects of lack of vitamin A in infancy and early childhood are manifested particularly in the development of certain ocular syndromes: babies in the first six months of life develop an acute and rapidly progressive keratomalacia, presumably because of poor intra-uterine storage of vitamin A and a low vitamin-A content in the breast milk; infants,

often at the weaning period and frequently suffering from kwashiorkor, develop xerophthalmia and keratomalacia; and older children, with no signs of keratomalacia, may have well-marked Bitot's spots.

Infantile beriberi

Beriberi, a disease associated with a diet consisting almost entirely of polished rice, is an important and widespread cause of infant mortality only in the rice-eating areas of South-East Asia. It is especially common in Burma, China, the Philippines, Thailand, and Viet Nam.

Infantile beriberi is attributable to lack of thiamine in the maternal diet, which results in poor storage of thiamine during foetal life, and low thiamine intake of the infant owing to negligible content in breast milk. Most babies suffering from this condition are fed exclusively on the breast; only very rarely have cases been reported in infants who are artificially fed.

Clinically, infantile beriberi may be classified into three syndromes, which more or less overlap: (1) acute cardiac (often occurring between 2 and 4 months), in which most of the physical signs are related to acute cardiac dilatation and failure; (2) aphonic (5-7 months), which is characterized by hoarseness, dysphonia, and aphonia ; and (3) pseudomeningeal (most frequent in the ages from 8 to 10 months), in which the clinical picture resembles tuberculous meningitis or an encephalitis.

Rickets

Rickets, a disease caused by lack of vitamin D, is, contrary to general belief, far from rare outside the temperate zone. In fact, the somewhat paradoxical situation has been reached in which the disease is now more prevalent in parts of the subtropics and tropics than it is in the temperate zone, where effective prophylaxis in the form of fish-liver oil or vitamin concentrates compensates for the lack of vitamin D which might be obtained from irradiation of the skin by the sun. Rickets appears to be common in Pakistan, India, some Eastern Mediterranean countries (e.g., Israel, Syria, and Lebanon), a few areas in tropical Africa, and some regions in South America.

Rickets in tropical infants may be due to a number of factors, such as maternal malnutrition (e.g., lack of dietary means of compensating for non-exposure to sunshine, such as occurs among women in purdah), lack of exposure to the sun, diet, diarrhoea (which may interfere with absorption of vitamin D and calcium), and lack of formation of provitamin. Dr Jelliffe provides an explanation for the factor most difficult to comprehend as concerns tropical people—lack of exposure to the sun:

> Despite the constant sunshine, in many towns in the subtropics and tropics infants do not receive much irradiation with ultra-violet light, since, especially in older walled cities, houses are crowded together with dark alleys and courtyards. Babies may be so swaddled that practically no skin is exposed, or they may be somewhat over-clothed, and carried slung in a wide cloth on the mother's back, as is the practice among the Yoruba of Ibadan town in Nigeria.

He also passes on a suggestion by B. S. Platt (personal communication) regarding lack of formation of provitamin, a subject which needs further investigation:

> I have a hypothesis on this subject which is that vitamin-D deficiency may be secondary to deficiency of vitamin A or of essential amino-acids, which in turn leads to follicular keratosis. My view is that vitamin D is formed *on* the skin, not in the skin, because presumably the precursors of vitamin D would be in the blood-stream, and the small blood-vessels are so far below the skin surface that light of the wave-length required to convert the precursors to vitamin D would not reach the blood. I think the precursors of vitamin D are more likely to be found on the skin in sebaceous secretion, irradiated there and then absorbed, the whole process being analogous to that which is known to occur in birds and which has been established for chickens, which take oil from the

preen glands and apply it to feathers, where presumably it is irradiated and absorbed.

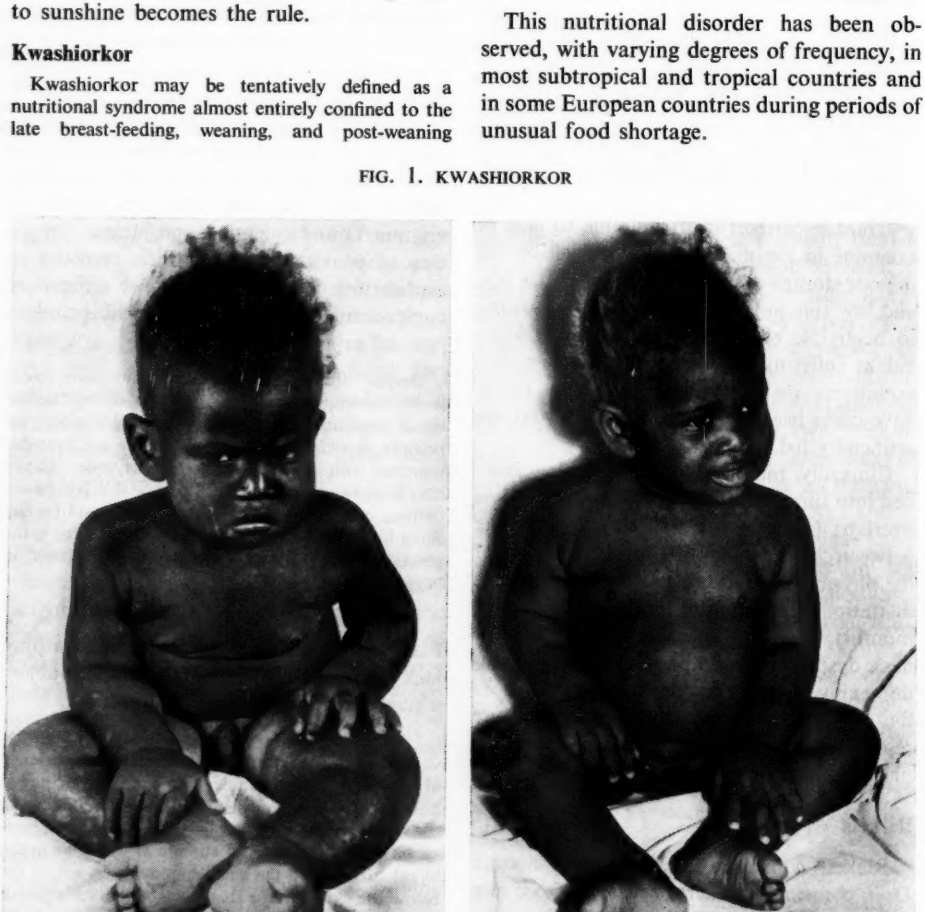
Generally speaking, rickets may be regarded as a debilitating and possibly deforming disorder in tropical infants, but not as a major cause of infant mortality. Usually it is healed in later childhood as more exposure to sunshine becomes the rule.

Kwashiorkor

Kwashiorkor may be tentatively defined as a nutritional syndrome almost entirely confined to the late breast-feeding, weaning, and post-weaning phases of life due to the deficiency, during this very active growth period, of protein of good biological value—that is, containing the essential amino-acids and, incidentally, vitamin B_{12} and other factors, known and unknown, present in animal protein—associated, at the same time, with a relatively normal, or even excessive, calorific intake in the form of carbohydrate.

This nutritional disorder has been observed, with varying degrees of frequency, in most subtropical and tropical countries and in some European countries during periods of unusual food shortage.

FIG. 1. KWASHIORKOR



Left, "sugar-baby" kwashiorkor in an infant, showing misery, oedema, blubbery excessive subcutaneous fat, moon-face, and hypochromotrichia. Right, the same infant after six weeks' treatment with skimmed milk, showing loss of oedema, general alertness, disappearance of rash, and normal hair growing from the roots. (Mona, Jamaica)

The clinical picture includes the following:

(1) growth failure, manifested by low body-weight and decreased length (notwithstanding the co-existence of oedema and, in some cases, of excess subcutaneous fat), and by a delayed bone age, as judged by radiology of the wrist joint;

(2) mental changes, including apathy and peevishness, with degeneration to a " vegetable-like condition " in advanced cases;

(3) oedema, beginning on the feet and lower legs and then involving, in some cases, the backs of the hands, the thighs, the sacrum, back, arms, and face;

(4) liver changes, including fatty infiltration and possible hepatomegaly;

(5) gastro-intestinal symptoms, such as anorexia and vomiting and, usually, loose and rather bulky stools containing undigested food;

(6) dyspigmentation, affecting either the skin or the hair or both;

(7) dermatosis, including a characteristic rash known as " flaky-paint " dermatosis and certain skin lesions;

(8) anaemia, a common but not invariable feature;

(9) avitaminoses, manifested by signs such as xerophthalmia, keratomalacia, angular stomatitis, acute glossitis and stomatitis, and desquamation at the outer canthi.

Kwashiorkor, which is the most common nutritional problem of tropical childhood, may be traced in most cases to shortage during the weaning period of suitable, easily digestible foods containing protein of good biological value, and to the social customs and ignorance that are responsible for failure to make proper use of those protein-rich foods which are available. A contributing factor is infection, especially gastro-enteritis.

Marasmus

" Marasmus " is a term used to describe the condition of infants suffering essentially from starvation, from actual deficiency of calories. The clinical picture which it presents is one of a " markedly underweight infant, with atrophy of both muscles and subcutaneous fat, and with a wizened, shrivelled, monkey-like face . . . ". Oedema is unusual and always minimal. There may be signs of associated avitaminoses.

It is sometimes difficult to draw a line between kwashiorkor and marasmus. Both syndromes can be considered in relation to protein deficiency, kwashiorkor being protein deficiency with calorific sufficiency from carbohydrate foods, and marasmus being protein deficiency together with a deficiency of calories.

METHODS OF IMPROVING INFANT FEEDING IN THE SUBTROPICS AND TROPICS

As has been previously suggested, planning improvements in infant-feeding practices in the subtropics and tropics must begin with an investigation of the methods actually employed. Practices which may seem strange and inadvisable must be examined objectively against the background of the living conditions of the people. For example, failure to realize that prolonged breast-feeding is a biological necessity in many areas might lead to advice which, if followed, could have disastrous consequences. And other practices which at first view seem undesirable may, upon further observation and reflection, be recognized as less harmful than possible alternatives. For instance, mastication of carbohydrate foods followed by feeding of the infant with the finely chewed, ptyalin-reinforced paste may be less bacteriologically dangerous than the preparation and serving of foods in unclean utensils in squalid surroundings.

Dr Jelliffe emphasizes the necessity of adapting infant-feeding methods to the existing conditions:

> Any measures designed to improve methods of infant feeding must be based on a realization of the

FIG. 2. MARASMUS

Left, nutritional marasmus in an infant, showing wasted muscles, absence of subcutaneous fat, and normal hair. Right, the same infant after three months' treatment. (Mona, Jamaica)

stark simplicity of most tropical houses and must also take into account the impossibility of storing food, the expense and frequent scarcity of fuel, and the minimum number of unelaborate cooking-pots. Any over-complicated advice envisaging the use of sterilized feeding-bottles and of precise measures and percentages of different foods is completely unreal, unpractical, and impossible. In most instances food for the infant is prepared at the same time and in the same pot as the adult diet. In many places there is an inadequate realization that infants are best suited by specially prepared foods. A minor and rarely stressed, but important, piece of practical advice is to suggest that the mother obtain a small, cheap, earthenware or iron, cooking-pot in which she can prepare foods intended solely for the infant.

Maternal and foetal nutrition

Since infant feeding begins in utero, attention must first be given to the nutrition of the pregnant woman. It is imperative that the mother be as well nourished as possible, especially during the last three months of pregnancy, when most of the foetal storage of essential elements takes place. The dietary advice given must be based on knowledge of local conditions, food customs, and prevalent infantile disease. In general, emphasis should be placed on adequate rest and on the fact that calorific needs are probably increased by as much as 20% in later pregnancy.

Particularly important is maternal protein intake. Use should be made of the available animal protein, and this should be reinforced with plant-protein foods. Iron deficiency should be guarded against by providing suitable iron-containing foods, such as green leafy vegetables, and by supplementing the iron intake through administration of ferrous sulfate tablets if necessary. Green leafy vegetables also help to supply calcium, which is especially important in areas where osteo-

malacia and rickets are common. If needed, additional calcium may be supplied in the form of medicinal lime-water. In areas where vitamin-A deficiency is common in infancy, mothers should be made aware of the significance of carotene-containing foods, particularly since the adult is probably a much better converter of carotene to vitamin A than is an infant. Finally, prevalence of infantile beriberi indicates a need to supply adequate thiamine (in the form of undermilled or parboiled rice or as legumes) to pregnant and lactating women.

Breast-feeding

Poorly nourished mothers seem often to initiate and carry on breast-feeding more easily than better-fed women in more-privileged socio-economic groups. However, the effect of prolonged lactation on inadequately nourished women, particularly from the standpoint of drain of protein, is a subject which still requires considerable investigation.

Breast-feeding in the subtropics and tropics usually begins on the day of birth; although the neonate probably requires no food for the first 24-48 hours, there is no reason why this practice should not be continued, at least in the normal baby.

Dr Jelliffe adds an interesting note concerning supplementary fluids during the early post-natal period:

> Fluids as such are not usually required in the first few days, but, in very hot weather, boiled water or coconut water may be given. (In this context it may be noted that the latter, when taken direct from the fruit, is a sterile solution containing 2-5% sugar and with salts present in amounts somewhat similar to those found in human intracellular fluid.)

Most mothers in the subtropics and tropics seem to feed their infants at all times of the day and at haphazard intervals, more or less following the present trend in Western-style paediatrics towards " self-demand " feeding. No attempt to alter this system seems necessary since it is " obviously functionally successful " and since " the fundamental test of whether a method of infant feeding is satisfactory is whether it works or not ".

Prolonged breast-feeding is essential for the growth, and quite often for the survival, of the majority of infants in the subtropics and tropics. Breast milk is, in fact, the " only easily available source of protein of good quality containing all the essential amino-acids ". Beyond the age of six months, however, the infant requires additional food, although breast-feeding should be continued as a means of providing a vital protein supplement to the other foods. As an approximate gauge, it is advised that breast-feeding be continued up to at least two years.

Obviously, maternal nutrition must be given due attention during lactation, every effort being made to ensure a good diet.

Introduction of semi-solids

Contrary to infant-feeding practice in other parts of the world, the introduction of semi-solids during the first six months of infant life cannot be recommended in the subtropics and tropics because of the tremendous danger of gastro-enteritis. Breast-feeding alone is the method of choice for the first six months.

As in the temperate zone, the first semi-solid foods in the tropics are usually starchy gruels and pastes. These gruels or pastes may be composed of rice, maize, oatmeal, or wheat—or, alternatively, crushed cooked plantain, sweet potato, Irish potato, or raw ripe banana. The banana occupies an unique position: it is the only food of calorific value which can be given to the infant uncooked and in an originally bacteriologically uncontaminated condition. Slightly unripe, the banana contains 12.8% of relatively indigestible starch and 11.6% of sugar; fully ripe, with brownish spots on the skin, it shows a change in composition—1.2% starch and

19.5% sugar, which is easily digested and absorbed by the infant.

Animal milk in infant feeding

Milk plays such a dominant part in present-day infant feeding in Europe and North America that it is difficult for anyone brought up in those parts of the world to realize that it is not a necessary foodstuff for any age-group and that, in fact, children have been, and are, habitually reared in many Mongolo-Malayan countries and on some Pacific islands without milk being used at all. This Western attitude has been termed "milk emotionalism", with milk having an almost magic significance.

Despite the facts that milk is not essential for successful infant feeding and that it plays little part at present in infant-feeding methods in the subtropics and tropics, any milk which may be available should be used to the best advantage, especially during the potentially protein-deficient phase of later infancy. Milk is an excellent source of protein of good biological value and is probably the best protein weaning food.

In countries where fresh animal milk is not a habitual food, mothers may be encouraged to use it, although nutritional advice should first be concentrated on making better use of traditional infant-feeding methods and foods. Where milk is already a common food, efforts should be made to increase both the production and conservation of it. It should be emphasized, however, that animal milk in the tropics is often dangerous and nutritionally variable, since it is usually subject to contamination, dilution with water, or adulteration with various substances—maize flour, for example.

Sweetened condensed milk is sometimes used in the tropics since it keeps well without refrigeration, owing to its high sugar content. In general, its use is misuse; and the results are far from satisfactory. The fat which it produces in infants sometimes disguises underlying malnutrition; only small amounts can usually be afforded, so that it is very frequently used largely as a flavouring; rickets and avitaminosis A are sometimes associated with its widespread use (its content of vitamins A and D is usually very low); and babies may become addicted to the sweetness and refuse to take the breast, with a resultant failure of lactation. When other forms of milk or protein weaning foods are not easily available, however, there may be a place for sweetened condensed milk, provided it is used in appropriate dilution (1:7).

Because of its comparative unavailability and high cost, dried powdered milk plays a very minor part in infant feeding in the subtropics and tropics. However, in recent years free or subsidized dried milk has begun to be distributed as part of the activities of maternal and child health (MCH) centres. But Dr Jelliffe points out that this practice presents numerous difficulties:

The future development of powdered skimmed-milk distribution is uncertain. The fundamental problem would appear to be how to make the best use of the available, cheap, protein-rich skimmed-milk powder from the milk-surplus countries in feeding the millions of protein-deficient children in various tropical countries while, at the same time, not overwhelming the MCH centres with milk-distribution duties or interfering with their primary function of teaching mothers and junior staff how to use available local resources to the best advantage. Moreover, fresh hazards to the health of the child may be created by the introduction of a new, strange, and uncontinuable foodstuff. It seems desirable that free or subsidized powdered skimmed milk should be distributed "selectively"—that is, primarily to countries where the need is greatest, the milk habit is already established, and an extension of dairying is practicable in the near future, or the continued importing of subsidized skimmed milk on a large scale is a feasible proposition, owing, for example, to the relative nearness to milk-surplus countries.

Prevention of the main nutritional diseases

In considering the prevention of the nutritional diseases common among infants in the subtropics and tropics, Dr Jelliffe again stresses the importance of supplying pregnant and lactating women with the food elements

essential to the child, providing vitamins, iron, and thiamine by " artificial " means when this is required. In addition, he draws attention to a number of practical measures and common foods which are probably too often neglected.

With regard to the prevention of iron deficiency, Dr Jelliffe notes the value of maximal drainage of blood from the placenta at birth, quoting McLean: [2]

> Regardless of the nutritional state of the mother, there is another prophylactic procedure which should be carried out in order to assure the infant his rightful supply of iron. This procedure consists of allowing the umbilical cord to cease pulsating prior to its severance following delivery. This measure will increase the infant's blood supply by about 100 cc. and will thereby add about 45 mg. of iron to the body store. The importance of this procedure can be appreciated when it is realized that this amount of iron is about twice the amount which the average infant retains from his diet during the entire first six months of life.

Dr Jelliffe adds that the flow of blood can be facilitated by placing the baby below the level of the placenta, and that " stripping " of blood by massaging the umbilical cord may be helpful if the circumstances of the labour do not allow the 5-15 minutes necessary for the transfer of the placental blood.

Another interesting point is made with reference to iron deficiency: the iron content of foods may often be augmented by cooking them in an iron pot. It has been reported that stewed apple cut up with an iron kitchen knife and boiled in an enamelled iron saucepan which was slightly chipped became as good a source of iron as best roast beef, and that the iron content of various Bantu foods — including maize, " cow peas ", and " sugar beans "—was greatly increased after boiling in iron cooking-pots.

Carotene-containing foods should be given to infants soon after six months to help in preventing avitaminosis A. Some of the foods suggested for tropical countries are pawpaws, mango juice, pumpkin, red palm oil, yellow sweet potato, bananas, and green leafy vegetables. The pawpaw tends to be rather neglected as a valuable food, although it grows easily in most tropical countries. It can be given to infants as an uncooked pulp, and it supplies vitamin C as well as vitamin A.

For the prevention of rickets, the simplest and least expensive measure for both mothers and infants is irradiation of the skin with sunlight—a measure which never seems to be advised. This might prove somewhat difficult in " overcrowded, old-fashioned Oriental cities ", where the mothers are often in purdah ; but some suitable technique of sunbathing should be able to be devised. Dr Jelliffe suggests that exposure of the back alone might meet the purpose. Witness to the practicality of obtaining vitamin D directly from the sun is the very low incidence of rickets among rural tropical children as compared with that among children living in towns in the same regions.

In giving advice aimed at the prevention of marasmus, attention must be paid to the necessity of prescribing protein as well as carbohydrate lest, in preventing marasmus, kwashiorkor be developed.

To prevent kwashiorkor, the best possible use should be made of all available animal protein, with particular attention being given to ways of employing fish for infant feeding, of " stretching " the available milk by mixing it with gruels, etc., and of using chicken or turtle eggs. Inasmuch as supplies of animal protein are apt to be quite inadequate in most subtropical and tropical countries, plant-protein foods assume great importance, and certain practical principles should govern their choice and use :

> First, if there is any possibility of choice so far as the initial starchy gruel or paste is concerned, the one with the highest protein content should be used—as, for example, rice in preference to banana. In addition, practical observation has shown that some plant foods appear to be less commonly associated with the development of kwashiorkor than others;

[2] McLean, E. B. (1951) *Pediatrics*, 7, 136

in this context, wheat and rice are better than maize, and sweet potato than cassava. . . .

A very important principle, which can be applied to infant foods as well as to the adult diet, is that of using plant-protein mixtures so that individual deficiencies of amino-acids may be mutually made good . . . cereals are usually poor in lysine but rich in methionine, while the converse is true of beans, peas, and legumes; consequently, it is obviously beneficial to take these two classes of foods mixed together, so that the essential amino-acids they contain will all be simultaneously available.

Legumes, in particular, are a valuable source of plant protein, usually containing from 20 % to 25 % of protein together with appreciable quantities of thiamine, riboflavine, calcium, and iron. Various combinations and preparations of legumes, many of them based on soya beans, are being tried as infant-weaning foods in subtropical and tropical countries.

NUTRITION EDUCATION

" To modify the ideas and so improve the practices of people as to how they nourish themselves and their children is no easy task ", yet this is one of the fundamental problems in improving infant nutrition in the subtropics and tropics. Among all peoples there are beliefs about certain foods which have little basis in fact. The " food ideology " of the people concerned as well as the nutritional resources and needs must be studied before any type of improvement can be planned.

The health worker whose aim is to help improve nutrition must therefore begin by acquiring the necessary background information, by familiarizing himself with local customs and conditions as much a possible. He can then turn to the task of presenting his ideas and facts to the people in such a way that they will be acceptable. Two basic principles are to work *with* the people rather than for them, and to key all efforts at improvement to the local conditions, so that what is proposed may be both practical and self-perpetuating.

CONTROL OF INSECT-BORNE DISEASES IN CEYLON

WHO-Aided Project

At the end of 1954, Professor C. Y. Chow, WHO entomologist, ended an assignment in Ceylon which had begun in late 1951. During this period he had helped to expand the activities of a training centre for the control of insect-borne diseases (established in 1939 as a malaria field training centre); to train local personnel in entomological techniques ; and to carry out research on methods of control of the insect-borne diseases prevalent in Ceylon. Professor Chow's final report records the accomplishments of this three-year project.

Training

Training was given to 350 persons, ranging from medical officers to " apothecary students ". The type and length of instruction varied according to the group—e.g., graduate entomologists and entomological assistants received three to four months of training ; medical officers of health, four to six weeks ; public health inspectors for filariasis control, three weeks ; public health inspectors and divisional revenue officers, one week ; public health inspector learners, three days ; apothecary students, one day. Professor Chow prepared a training manual on insect-borne-disease control and made use of films, slides, insect specimens, and charts in his teaching.

Malaria control

Malaria was already being effectively controlled by a national antimalaria campaign

when the WHO-aided project began. However, the WHO consultant undertook certain experimental work, in collaboration with the national campaign, to determine the optimum dosage of DDT and the cycles of spraying best for Ceylon. Three villages were sprayed, each with a different dosage of DDT, and a fourth was left unsprayed as a check area. This experiment showed that the only malaria vector of Ceylon, *Anopheles culicifacies*, could be controlled by DDT residual spraying at a dosage of 2 g per m^2 (200 mg per sq. ft), in two or more applications depending upon the local situation—i.e., two sprayings per year in areas where walls and roofs were not subjected to replastering or changing, and four sprayings where structures were repaired frequently or where new construction was common.

Studies were made of the bionomics of the vector, particularly of its resting habits. Other investigations, including those relative to time of entry and exit from buildings, longevity, and feeding habits, were planned by Professor Chow and were subsequently carried out by the entomologist of the national antimalaria campaign.

Filariasis control

With effective control of malaria having been achieved, filariasis has become the principal insect-borne-disease problem in Ceylon. Two types of filariasis are present: the urban type, caused by the parasite *Wuchereria bancrofti*, and the rural type, caused by *W. malayi*.

The vectors of rural filariasis in Ceylon are *Mansonia* mosquitos, particularly *M. uniformis*. Since *Mansonia* mosquitos breed in association with certain aquatic plants, especially water lettuce *(Pistia stratiotes)*, various means of ridding the affected areas of these plants were tried. Pistia clearance by manual removal proved both expensive and unsatisfactory, but excellent control by herbicides was achieved. *Salvinia* (water fern), another host plant of the *Mansonia*, was also effectively controlled by chemicals. Details of the results of the experiments with herbicides against both of these aquatic plant hosts have been reported in the *Bulletin of the World Health Organization*.[1]

The vector of the urban type of filariasis is *Culex fatigans*, and this mosquito was studied for more than two years in Kurunegala. Field observations showed that DDT indoor residual spraying failed to control this vector ; BHC and dieldrin were also tried, but no conclusive results could be obtained. It was concluded that adulticides were an unsatisfactory means of control, that fundamental sanitary measures (e.g., installation of proper systems of drainage and sewerage) were essential to effective control, and that larvicides were the method of choice until the general sanitary situation could be improved. Of the locally available larvicides tested, dieldrin and BHC appeared to be the best.

Housefly control

While general sanitation is also of primary importance in the control of the housefly, insecticides may be used as a supplementary measure if necessary. Professor Chow devised a simple and effective means of housefly control—a portable frame supporting strings soaked in insecticide. This device gave a much greater chance for the housefly (which does not commonly rest on places which are subjected to residual spraying) to contact the insecticide residue. Dieldrin emulsion was found most satisfactory for use on the frame, both in the laboratory and in the field. The residual effect seemed to last at least two and a half months. Details of this experiment have also been published in the *Bulletin of the World Health Organization*.[2]

[1] Chow, C. Y. (1953) *Bull. Wld Hlth Org.*, 9, 571; Chow, C. Y., Thevasagayam, E. S. & Wambeek, E. G. (1955) *Bull. Wld Hlth Org.*, 12, 365

[2] Chow, C. Y. & Thevasagayam, E. S. (1953) *Bull. Wld Hlth Org.*, 8, 491

In certain localities in Ceylon, houseflies developed resistance to the chlorinated hydrocarbon insecticides, particularly to BHC and dieldrin ; this problem was studied by Professor Chow and his co-workers. The organic phosphorus group of insecticides was subsequently to be tried for housefly control in the localities where resistance to the chlorinated hydrocarbons had been observed.

Head louse control

A survey was made of head louse infestation among schoolgirls from 4 to 21 years of age in the urban area of Kurunegala. Over 90% of them were found to be infested with nits, and between 50% and 60% with head lice. The age group 11–15 years was most affected.

A comparative study of Lorexane (1% gamma-BHC) and Ascabiol (25% Benzyl benzoate) was made. The former was shown to be far superior to the latter, and to be much less expensive as well.

Project results

Professor Chow, at the end of his assignment, left a training centre which had been greatly expanded and improved, staff prepared to continue the work, and valuable knowledge of the best methods of controlling insect-borne diseases in Ceylon. The field research which had been conducted under his supervision had modified the public health methods in practice and had in some cases drastically reduced the costs of controlling diseases which were a major health problem in Ceylon.

THE EDUCATION OF SANITARY ENGINEERS

European Symposium

" Today one cannot imagine an efficient public-health organization, that is, an integrated public-health service, which does not give a proper place to the sanitary engineering services performed by a qualified sanitary engineer assisted by the necessary auxiliary personnel." [1] Yet in most countries there are few, or no, sanitary engineers, and no facilities for training them.

In recent years WHO has done much to focus attention on the basic importance of environmental sanitation and to stimulate interest in the development of sanitary engineering as an essential part of public health services. Among other relevant activities has been the sponsorship of four seminars for European sanitary engineers, the first of which was held in 1950. These seminars made apparent a need to review the situation with regard to the education of sanitary engineers in Europe, to study the problem of how more sanitary engineers could be trained to meet the demands of countries both within and outside Europe and in connexion with the work of WHO. Consequently, the Regional Office for Europe organized a symposium on the education of sanitary engineers, held at Oxford from 2 to 7 April 1955.

In preparation for this symposium, Professor Milivoj Petrik, of the University of Zagreb, made a survey of education in sanitary engineering in Europe and the USA. It was thought advisable to include the USA because it is one of the few countries in which the sanitary engineer has been given a prominent place in the public health team.

[1] Stampar, A. (1955) *The role of sanitary engineers in public health work* (Unpublished working document EUR/S. Eng.Trg/6)

The information which follows is drawn from Professor Petrik's reports.

UNDERGRADUATE EDUCATION

USA

At least nine schools of engineering in the USA offer undergraduate courses in sanitary engineering: the Massachusetts Institute of Technology, and the engineering schools of the following universities: California, Illinois, Michigan, Wisconsin, Johns Hopkins, Tulane, Cornell, and Purdue. A separate department of undergraduate training in sanitary engineering exists at the Massachusetts Institute of Technology and at the University of Illinois.

Undergraduate courses in sanitary engineering usually come within the curricula of civil engineering. Among the subjects commonly covered are: water supply and sewerage, water supply and treatment, sewage disposal and treatment, environmental sanitation, sanitary engineering laboratory, chemistry or analysis of water and sewage, sanitary engineering design, hydrology, and bacteriology. Less common, but included in the curricula of some schools, are biology and microbiology, plant operation, industrial waste treatment, public health administration, epidemiology, biostatistics, hydraulic engineering, and city planning.

Europe

Sanitary engineering is included to some extent in all undergraduate training in civil engineering in continental schools. The most common subject is water supply and sewerage, which may be a separate course or part of a larger course in hydraulic engineering. Other subjects which may be taught are water and sewage treatment methods, the chemistry and biology of water, industrial hygiene, town planning and housing, heating, ventilation, and air conditioning. In no case does undergraduate training cover the entire field of sanitary engineering; there is seldom any instruction in food control, and little instruction in vector control or in occupational sanitation and the hygiene of housing. Nowhere is there a separate subdivision of sanitary engineering; at best there is an option of sanitary engineering subjects in the highest semesters, as in Delft and at the largest Yugoslav engineering schools.

In general, the undergraduate training of civil engineers in Europe tends to be conservative in character, and a separation of sanitary engineering from civil engineering to be looked upon with disfavour. Even changes or the introduction of new courses may often meet with the greatest obstacles, and sanitary engineering subjects of a more or less non-technical nature may have to be " brought in by the back door " by inserting them in official courses on hygiene.

In Great Britain and in Ireland, undergraduate training is usually of a general character, with specialization confined to post-graduate studies. Consequently, not many subjects of sanitary engineering appear in the undergraduate curricula.

POST-GRADUATE EDUCATION

USA

There are two types of post-graduate education in sanitary engineering in the USA: one is training in the schools of public health, designed to prepare students for work in public health services; and the other is training in engineering schools, concentrating on design, construction, and consulting work.

In the first kind of training, given in ten of the accredited schools of public health (California, Columbia, Harvard, Johns Hopkins, Michigan, Minnesota, North Carolina, Pittsburgh, Tulane, and Yale), emphasis is laid on the basic public-health courses—e.g., epidemiology; communicable,

parasitic, and occupational diseases; bacteriology; biology and microbiology; parasitology; entomology; physiology; principles and practice of public health; sanitation; vital statistics; industrial and occupational health; and the organization and administration of public health services. The purely engineering subjects come in second place.

Although all the schools aim at preparation for the general and average requirements of public health services, some stress service under special conditions—e.g., Columbia, public health administration in the tropics; Tulane, work in warm climates; and Harvard, work in industrial and occupational health and on microclimatology. There are no engineering courses proper in the curricula of the schools of public health of Pittsburgh, Tulane, and Yale.

The wide variety of courses available in most of the schools offers possibilities for giving particular attention to a great number of special problems, but the best opportunities are in water and sewage engineering. The training, as a rule, comprises one academic year and leads to a Master's degree. It is usually composed of a restricted number of compulsory courses, mostly in basic subjects, with a number of elective courses which may cover all engineering subjects.

The second type of training is given in schools of engineering, such as the Massachusetts Institute of Technology, or the relevant schools of the following universities: California, Harvard, Illinois, Michigan, Minnesota, Texas, Wisconsin, Cornell, Johns Hopkins, New York, and Purdue. In these schools training is concentrated, naturally, on engineering subjects, particularly on water and sewage engineering. Instruction in basic subjects of public health is usually restricted to general courses in public health, sanitary engineering, or sanitation, and in sanitary chemistry and biology. All the twelve schools have general courses in sanitary engineering, and about half of them, courses in sanitary chemistry and biology. There are occasional courses in industrial or occupational sanitary engineering; Harvard University and New York University offer the possibility of specializing in industrial sanitary engineering. No school offers separate courses in food sanitation, only one offers special courses on animal vectors, and courses on housing and town planning are rare.

In addition to graduates in civil or sanitary engineering, those in chemistry or biology may be admitted for post-graduate study at the engineering schools.

There is great fluidity in the curricula of the various schools in the USA, which makes experimentation possible and facilitates evolution and progress.

Europe

Regular and full-time post-graduate training in sanitary engineering is given at only five universities in Europe: the Engineering Faculty of the University of Naples, the Imperial College (London University), King's College of the University of Durham, the Faculty of Applied Science of the University of Liège, and the School of Public Health of the University of Zagreb.

Water and sewage engineering is the core of all the courses, which require a complete academic year. In all of them the whole of the curriculum is compulsory, without any optional subjects except at Zagreb, where the curriculum is adapted to the various kinds of engineers admitted to the course. Laboratory work, elaboration of a major project, field work, and excursions are part of all the curricula. Some subjects are common to all five courses ; but, generally speaking, each programme is designed to meet the specific needs of the countries served. The Naples and Zagreb courses are national in character, whereas the British courses are based on Commonwealth needs and are therefore suited to train students from different countries.

Most of the courses are open chiefly to civil engineers, though at Zagreb chemical and mechanical engineers or architects may be admitted, but have to follow the option of the curriculum best fitted to their previous studies.

Post-graduate training in sanitary engineering is also given at the Institut de Technique Sanitaire of the Conservatoire National des Arts et Métiers at Paris, where a two-year course is arranged for evenings only, four days a week, two hours a day, for students who are occupied during the day in their usual work. The curriculum covers the entire field of environmental sanitation, except food hygiene, with a view to work in rural and tropical conditions, and is carried out by prominent teachers.

There are two more types of post-graduate studies in sanitary engineering in Europe, not connected with formal courses. One is short-term, or refresher, courses, such as have been given at the Engineering School at Delft, the Institute of Hygiene in Lisbon, and the Institute of Hygiene in Belgrade. The second type is post-graduate research work in sanitary engineering subjects in university institutions, which may lead to a doctorate. Activity of this kind is found in Great Britain, Zurich, Liège, Stuttgart, and Naples. Similar in character and in effect is post-graduate work of an equally free nature for the degree of " licentiate " in the engineering schools of Copenhagen and Helsinki.

Preparations are being made for regular post-graduate education in sanitary engineering at several schools of engineering—e.g., Zurich, Delft, Stuttgart, Milan, and Istanbul.

THE SYMPOSIUM

The symposium participants defined sanitary engineering (or public health engineering, as it is called in some countries) as " the control by engineering means of man's physical environment so as to promote his physical, mental, and social well-being ". They stressed the importance of the sanitary engineer's functioning as part of the health team and noted that as yet there is not sufficient recognition in Europe of the necessity for having highly trained sanitary engineers in their " rightful place in the public health administration at various levels ". In addition, they called attention to the need for sanitary engineers in underdeveloped countries all over the world.

Recognition of the need for sanitary engineers could aid in promoting adequate educational and training facilities. In most European countries, educational facilities are available for specialist engineering training in sanitation, but they do not provide the broad approach to sanitary engineering which is particularly important in the training of sanitary engineers for work in the less-developed countries.

The preparation of the sanitary engineer should include at least one year of full-time, academic, post-graduate education in the subject. This training has been found to be especially effective if it takes place after some years of engineering experience. Appropriate practical experience should, in any case, be part of every course.

Where full-time, academic instruction is not possible, part-time, post-graduate instruction, encompassing the same material and extending over not more than about two years, may be regarded as an acceptable compromise, provided that it occupies the same total instruction time and includes the same practical work.

While undergraduate instruction can never be considered a substitute for post-graduate education, it is of value. It may range from a descriptive treatment of, for example, water supply and sewage disposal to a very much fuller treatment of sanitary engineering, including some of the background non-engineering subjects. It would be of benefit if instruction in all branches of engineering

could include, at an early stage, a short series of lectures on the social, and especially the health, implications of engineering.

Short courses are a useful means of bringing up to date the knowledge of practitioners in sanitary engineering. Such courses may be provided by universities, professional associations, or other institutions.

The most suitable and most common undergraduate preparation for the relevant post-graduate education is probably that of the civil engineer, though graduates in chemistry, biology, mechanical and chemical engineering, and architecture are not necessarily excluded.

The fundamental purpose of post-graduate education in sanitary engineering is to make the student "health minded", so that he may fit into the health team. This means that the basic curriculum should comprise a general review of environmental sanitation, including its role in human society and in public health; epidemiology; chemistry, including toxicology; biology, including microbiology and parasitology; and study of animal vectors of disease. The curriculum should also provide courses in such engineering and other subjects as are suitable to the sanitary engineer's previous training and experience and to his future needs. Field work, laboratory work, and design are essential components of the teaching programme. Research is a valuable stimulus to both teacher and student.

The symposium participants remarked that among the most serious obstacles to post-graduate education in sanitary engineering is that of its cost, from the standpoint of both the institution giving the instruction and the student. The importance of fellowships for such studies was emphasized, and the particular role of international agencies in this regard was pointed out. WHO and other international agencies have a special responsibility, it was stated, because of the urgent need for sanitary engineering personnel in the less-developed countries. International agencies should also aid in stimulating the establishment of courses for sanitary engineers in countries where the need for their education and employment has not yet been fully recognized. Still another task of international agencies is to facilitate the exchange of experience among teachers in various countries, through such means as seminars and symposia—of which this WHO symposium on the education of sanitary engineers in Europe was a good example.

MORTALITY FROM CANCER OF THE RESPIRATORY SYSTEM

A significant increase in deaths from cancer of the respiratory system—especially of the lungs, trachea, and bronchial tubes—is revealed in a statistical review published in a recent number of the *Bulletin of the World Health Organization*.[1] In all of the sixteen countries of Europe, America, and Oceania covered by the study, there was a steady rise from 1949 to 1952 in mortality from cancer of the respiratory system, in both men and women. Men were affected five or six times as often as women, however.

Some of the factors suggested as possibly influencing the recorded rise in deaths from cancer of the respiratory system are:

(1) the ageing of the population and the consequent swelling of the 40-80-year age group, in which cancer is most prevalent;

(2) a decrease in mortality from tuberculosis of the lungs, which may have made recognition of cancer cases easier; and

[1] Pascua, M. (1955) *Bull. Wld Hlth Org.*, 12, 687

(3) improvements in diagnostic techniques and case-finding.

The situation in the countries included in this study may be briefly summarized as follows.

Federal Republic of Germany: There has been an increase in death-rates of 40% in men as compared with 29% in women. The main rise took place, for both sexes, at the age of 50 years or older.

England and Wales: Practically no increase for either sex in fatal cancer of the nose, nasal cavities, middle ear, sinuses, larynx, etc. has been noted. Yet deaths from cancer of the lung, trachea, and bronchial tubes have climbed steadily by about 31% in males and 21% in females. The principal increase occurred in the age group 50-80 years, especially in men.

Scotland: A 36% rise in mortality from cancer of the respiratory system is recorded for men for the period 1949-52, but no appreciable increase is observed for women.

Denmark: Here mortality-rates are less than half the corresponding ones in England and Wales, yet death-rates from cancer of the respiratory system have increased by 49% in males and 51% in females during the brief period of four years. The rise occurred almost entirely in the age group 45-85 years.

Ireland: Although mortality-rates for cancer of the respiratory system are not high, they have increased by 47% in males and 62% in females.

TABLE I. INCREASE IN DEATHS FROM ALL FORMS OF CANCER AND FROM CANCER OF THE RESPIRATORY SYSTEM FROM 1936-38 TO 1950-52

	Percentage increase of mortality from cancer of all kinds for all ages		Percentage increase of mortality from cancer of the respiratory system for all ages	
	Men	Women	Men	Women
Union of South Africa	15	12	148	152
Canada	23	4	192	54
United States	31	6	188	77
Denmark	19	6	287	108
Finland	35	21	187	183
Ireland	15	15	228	103
Italy	32	20	196	141
Norway	17	13	233	50
Netherlands	15	1	69	29
United Kingdom				
England and Wales	25	8	174	83
Scotland	31	9	229	86
Northern Ireland	24	5	188	36
Switzerland	7	11	101	70
Australia	8	7	159	65
New Zealand	27	18	179	59

TABLE II. DEATHS FROM CANCER OF THE RESPIRATORY SYSTEM AS PERCENTAGE OF TOTAL CANCER DEATHS

Country	Men		Women	
	% in 1936-38	% in 1950-52	% in 1936-38	% in 1950-52
Union of South Africa	7.9	17.2	2.3	5.3
Canada	6.2	14.8	2.5	3.6
United States	8.1	18.0	2.5	4.0
Japan		5.7		2.8
Germany, Federal Republic		16.1		3.4
Austria		23.6		3.9
Denmark	4.1	13.6	1.6	3.1
Finland	12.6	25.6	2.1	5.0
France		15.9		3.8
Ireland	4.4	12.4	2.8	4.9
Italy	5.8	13.1	1.9	3.9
Norway	2.6	7.4	1.9	3.2
Netherlands	9.3	19.9	2.5	3.1
United Kingdom				
England and Wales	12.9	28.3	3.6	6.0
Scotland	10.4	26.2	3.9	6.6
Northern Ireland	7.2	16.7	3.4	4.4
Switzerland	9.1	17.0	2.0	3.0
Australia	6.5	15.5	2.4	3.6
New Zealand	7.7	16.9	2.7	3.6

Italy: A serious upswing in mortality among men (45%) and a more moderate one for women (13%) has been observed, the ages mainly involved being in the group 45-80 years.

Finland: There has been a considerable increase in mortality among both sexes above 50 years of age (30% in men).

France: A 30% increase has been noted for males, but one of only 9% in females.

Norway: A rise of 32% has been noted among men, but a relatively low death-rate among women.

Netherlands: No rise has been recorded for women, but one of 24% for men.

Switzerland: A 28% increase has been recorded for men, but none for women.

USA: There has been a 21% increase for men, compared to 10% for women.

Canada: A rise in recorded mortality from neoplasms of the respiratory system has been noted in males, but not in females.

Japan: Death-rates from cancer of the respiratory system are low, but they have nevertheless risen by 68% among men and 83% among women.

Australia: A 25% increase has been recorded among men.

New Zealand: Deaths from cancer of the respiratory system have mounted by 46% for men, with about the same percentage increase for women. However, the actual number of cases among women is very much lower.

This *Bulletin* study points out that cancer of the lung, in particular, is becoming an important medical problem to which close attention must be paid.

WHO has also issued, in the *Epidemiological and Vital Statistics Report*,[2] an even more comprehensive statistical study of mortality from cancer of the respiratory system. This includes a table comparing the increase of deaths from cancer of the respiratory system with the increase in deaths from all forms of cancer from the period 1936-38 to the period 1950-52 (table I, page 235).

Another table shows deaths from cancer of the respiratory system as a growing percentage of all cancer deaths in the same two periods. In Canada, for instance, deaths from cancer of the respiratory system in men of all ages represented only 6.2% of deaths from all kinds of cancer in 1936-38, but by 1950-52 the proportion had risen to 14.8%.

[2] *Epidem. vital Statist. Rep.*, 1955, 8, 211

CANCER AS A SUBJECT OF INTERNATIONAL STUDY

In late June 1955, a group of consultants [1] met, at the invitation of the Director-General of WHO, to give advice on the Organization's activities in cancer. The meeting was of an informal nature only, intended to give the Director-General an opportunity to obtain from a group of outstanding experts some suggestions as to the further role which an international organization such as WHO might have in advancing the study of, and combating, a disease which is already being studied extensively on both a national and an international scale.

The meeting began with a review of the present work of WHO in cancer. Thus far the Organization's contributions have been largely statistical. Through the Expert Committee on Health Statistics and one of its subcommittees, WHO studies problems in the collection of cancer statistics. In line with WHO accepted practice, these committees do not undertake cancer statistical studies themselves but serve as a means of disseminating information on methods suitable for national institutions, with a view to assisting international comparability of data and facilitating etiological and epidemiological studies.

The Organization has made a number of studies on cancer, in particular an extensive one on cancer mortality,[3] based on an analysis of data collected in a number of countries. In addition, the general statistical material sent by governments and published by WHO in its monthly and annual epidemiological and vital statistics series is a further basis for cancer and other studies.

WHO, in the period 1947-54, granted 25 fellowships for studies in cancer.

The consultant group provided the Director-General with an outline of cancer prob-

[1] The group was composed of Professor J. H. Maisin (Chairman), Institut du Cancer, Louvain, Belgium ; Dr I. Berenblum, Weizmann Institute of Science, Rehovoth, Israel ; Dr J. Clemmesen, Cancerregisteret, Copenhagen, Denmark; Sir Harold Himsworth, Secretary, Medical Research Council, London, England; and Professor V. R. Khanolkar, Director, Indian Cancer Research Centre, Bombay, India. Dr G. Burroughs Mider, of the USA, was to attend but was prevented from doing so at the last moment.

[3] Pascua, M. (1952) Evolution of mortality in Europe during the twentieth century : cancer mortality. *Epidem. vital Statist. Rep.*, 5, 1-144

lems of international interest and with suggestions for possible WHO action. It considered that increased international action was justified because of (1) the great expansion in cancer research since the Second World War, and the fact that only a few countries have thus far taken part in the investigations ; (2) the need for study of " apparently perplexing variations in the incidence of certain types of cancer in different countries and different peoples ", which suggest the possibility of associations between social, racial, and environmental factors and the prevalence of certain forms of the disease, and which call for the collection of data at an international level ; (3) the present unavailability of statistical information from many countries and communities—information which is essential for large-scale study of fundamental aspects of cancer ; and (4) the growth of medical services in many countries, with a consequent demand for services to deal with cancer.

It was suggested that WHO might consult the Committee on Tumour Nomenclature of the International Union against Cancer with a view to setting up an appropriate group to deal with problems of definitions, nomenclatures, and classification of different types of cancer. Eventually the recommended definitions and nomenclatures emerging from the work of such a group might be published and distributed by WHO.

The publication of statistics on cancer should continue to be part of the Organization's work in this field, and countries should continue to be encouraged to improve their medical statistical systems and hence the accuracy and completeness of the relevant returns which they submit to WHO. In addition to publishing tables of cancer statistics, the Organization should make and publish more analytical studies of the available data. Wherever possible, statistics of different degrees of reliability should be presented separately. The consultant group pointed out that the publication of cancer statistics might also contribute to the epidemiological study of the disease, to the determination of possible correlations between cancer and racial and environmental factors, for example.

The Organization should urge countries to study any unusual cancer situations which have been observed, and should assist in the arrangement of studies in groups of countries with apparently similar general conditions but apparently different cancer pictures. Assistance might take the form of sending suitable experts to such countries and of training local personnel for co-ordinated studies.

Extensive programmes in laboratory and clinical research in cancer, supported by adequate resources, are in progress in a number of countries. The consultant group saw no need for WHO to enter directly into this aspect of cancer study. However, it concluded that there were several useful ways in which the Organization could take part in this basically important work : it could help to train workers for countries initiating or extending local research programmes, arrange for exchanges of scientific personnel, publish results of research, act as a clearing-house for information, and generally promote extension of international co-ordination in cancer research. It was suggested specifically that the Organization might put inquirers into touch with sources able to supply information on carcinogens.

An essential role for WHO would be to gather continuously, on a world-wide scale, data from which specific problems suitable for investigation could be identified, especially problems of an epidemiological nature. The Organization could then encourage the country or countries concerned to develop the required research programmes for investigation of such problems.

The application of uniform definitions and nomenclatures would be of value in inter-

nationally assisted research in cancer, and to this end WHO might promote the use of pathological and radiological atlases. Even more effective would be a system of reference laboratories holding specimens corresponding to internationally recommended definitions. A collection of suitable reference specimens might be obtained in three stages :

(1) A committee, composed mainly of pathologists, could be convened by WHO to indicate the items requiring classification.

(2) Small study-groups from different countries might then bring their material together and agree on typical specimens.

(3) The committee could subsequently make recommendations for the selection of specimens and the reference laboratories to hold them.

Standard X-ray films, too, might be held for reference. WHO's experience in establishing a reference system for biological standards would be of value in undertaking an activity of this kind.

In cancer, as in other subjects, WHO could play a part in the co-ordination of research, providing a mechanism for groups of countries to investigate together problems which lend themselves to common study.

With regard to the diagnostic and therapeutic aspects of cancer, WHO assistance would probably take the form chiefly of consultant advice to countries requesting it, aid in training personnel, and the reference system of laboratory specimens and X-ray films previously referred to.

The existing WHO services for assistance in the training of personnel and in the dissemination of technical information could meet the demands of increased activities relevant to cancer. Fellowships, seminars, working groups, exchange of scientists, assistance to educational institutions through provision of staff, and refresher courses could all be used to further the ends of an enlarged programme in cancer. WHO publication and library and reference services could also be extended to meet the needs of increased interest in cancer.

In all of the Organization's activities relative to cancer, liaison and co-ordination of efforts with other agencies working in this field would be important, and is, in fact, already being maintained—with UNESCO, in connexion with research on cell growth ; with FAO, in considering the possibly carcinogenic properties of some food additives ; and with non-governmental organizations, such as the International Union against Cancer, with whom the Organization might act jointly in many programmes.

The above suggestions do not represent an actual cancer programme for WHO ; the drawing-up of such a programme would come within the responsibility of the Director-General and the Organization's governing bodies. These suggestions are indicative, however, of a growing awareness that cancer should not be considered as a local or national problem, that study of some of the fundamental aspects of the disease requires international co-ordination and co-operation.

WHO LIBRARY SERVICES

The WHO Library, which includes the library of the former Office International d'Hygiène Publique, contains over 30 000 volumes and a large collection of reprints, official documents, and government reports. For documentation on disciplines allied to public health (i.e., social and economic sciences, industrial problems, etc.), there are available in Geneva the very large collections of the UN Library (400 000 volumes, including the medical and public health sections of the former League of Nations Library) and the International Labour Organisation (350 000 volumes, including a large section on occupational hygiene and safety).

In 1954 the WHO Library received regularly 1631 medical and scientific periodicals, 81 statistical bulletins, and 25 official gazettes. In addition, 1454 annual reports were received from health administrations and institutions, government departments, and other sources. A special feature is a comprehensive international collection of medico-bibliographical tools (indexing and abstracting periodicals, library catalogues, national bibliographies, publishers' catalogues, handlists and union lists of periodicals, etc.), essential in answering inquiries for medical documentation.

The Library is serviced by a staff of 18, representing 8 different nationalities and able to work effectively in 14 languages.

During 1954 and the first half of 1955, information was supplied to inquirers from the WHO regional offices and from the following countries: Argentina, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, French Equatorial Africa, Germany, India, Italy, Morocco (French Zone), the Netherlands, Norway, the Philippines, Poland, Portugal, Southern Rhodesia, Sweden, Turkey, the United Kingdom, the USA, and Yugoslavia.

More than a thousand periodicals are regularly scrutinized and articles of interest to WHO indexed by subject and by country. Annual comprehensive bibliographies on the quarantinable diseases (cholera, plague, relapsing fever, smallpox, typhus, yellow fever) are prepared and published regularly in the *Bulletin of the World Health Organization*. Other bibliographies are published from time to time in the *Bulletin* (e.g., on toxicology of pesticides, and on influenza) or are issued as WHO mimeographed documents (e.g., a bibliography on rural hygiene); others (100 during 1954 and the first half of 1955) are prepared in response to requests from WHO technical staff and from national health departments and institutions, and a limited number of copies of such bibliographies are usually available on request.

Close contact is maintained with other medical and scientific libraries throughout the world, and the WHO Library participates in the international network of inter-library loans through the service operated by the Bibliothèque Nationale Suisse in Bern. During 1954, more than 900 items were lent to Swiss university, medical, and scientific libraries. In addition, microfilms or photocopies of material not available nationally were supplied to WHO regional offices and to libraries in Aden, Argentina, Cambodia, Czechoslovakia, Fiji, Finland, France, Germany, India, Iran, Israel, Italy, Japan, Kenya, Liberia, New Guinea, Norway, the Philippines, Poland, the Seychelles, Union of South Africa, Sweden, Taiwan, the United Kingdom, the USA, and Yugoslavia.

As the result of a recent installation by WHO of modern photocopying equipment, the WHO Library will shortly be supplying photocopied slips of all articles indexed to WHO regional offices requesting them. A

central cataloguing service by means of photocopied catalogue cards has been in operation for more than two years. The new equipment will also make possible a more rapid and economical reproduction of articles from medical literature.

Seven WHO medical library fellows, including 2 fellows from Finland, 1 from Norway, and 3 from Yugoslavia, have spent portions of their period of study working in the WHO Library. Similar facilities have been provided to UNESCO library fellows and to student librarians from the Geneva School of Librarianship.

The *WHO Library News*, which is issued monthly, is distributed free of charge, but only on request, to 241 medical and university libraries. *Library News* consists of a list of recent accessions to the Library, bibliographical notes, and, occasionally, supplements of medical documentation interest, such as a handlist of periodicals regularly received by the WHO Library and an annotated list of medical indexing and abstracting periodicals. Other supplements dealing with annual public-health reports and review periodicals are in preparation and will be issued shortly.

At the request of UNESCO, WHO has recently agreed to assume certain responsibilities formerly undertaken by the UNESCO Clearing House for Publications concerning the international exchange of medical publications. WHO will not itself collect or dispatch material but will act as a clearing house, informing medical libraries in its Member States of the availability of medical books and periodicals offered for exchange or disposal by libraries. The present UNESCO mailing list of 237 institutions will be retained, and contact will be made with the national exchange centres which have been established in Austria, Belgium, Denmark, Portugal, and other countries.

Statistics on Epilepsy

The nature of epilepsy makes the collection of statistics on the disease difficult. In fact, although epilepsy is in itself rarely a cause of death, mortality statistics provide the only general statistical documentation of the disease. These and other difficulties are noted in the introduction to statistics on epilepsy which have recently been published in the *Epidemiological and Vital Statistics Report* (1955, Vol. 8, No. 6). These statistics include tables on deaths from, and mortality-rates for, epilepsy in certain countries since the beginning of the century, and on deaths in other countries since 1920. A breakdown by sex and age of the data on deaths and mortality-rates in selected countries is also given.

Notes and News

Nursing Education Seminar

A second WHO-sponsored seminar on nursing education in the Western Pacific Region was held, at the invitation of the Government of Fiji, in Suva, Fiji, from 4 through 28 July 1955. This seminar was a natural follow-up to a similar one held in Taiwan in November 1952.[1] It was attended by consultants on general education and social anthropology as well as by personnel directly concerned with the education of nurses and the administration of nursing services. There were participants from Australia, Brunei, Cambodia, China, Federation of Malaya, Fiji, Guam, Hong Kong, Japan, Korea, Netherlands New Guinea, New Zealand, the Philippines, Sarawak, Singapore, Territory of Papua and New Guinea, Tonga, Trust Territory of the Pacific Islands, Viet Nam, and Western Samoa.

Among the topics discussed at the seminar were : (1) the basic education of nurses, with particular reference to clinical nursing practice; (2) the relation of hospital and nursing service administration to educational programmes for nurses; (3) the preparation of nurse educators and other post-graduate programmes, and the relation of such programmes to the requirements of the health services of a country; and (4) the preparation of auxiliary nurses and midwives.

Co-ordination Office for Malaria Eradication Programme

The Pan American Sanitary Bureau, which is also WHO Regional Office for the Americas, has established in Mexico City a special office for providing technical advice and co-ordination for the malaria eradication programme which is being undertaken in the Western Hemisphere. This office will develop technical standards for antimalaria campaigns; give advice to governments on the planning, operation, and evaluation of eradication projects, and on technical procedures for assuring the successful completion of such projects; develop a system for reporting and evaluating results; and assist in the training of personnel.

The chief of the office is Dr C. Alvarado, Regional Malaria Adviser, who will be assisted by an entomologist, an epidemiologist, and a sanitarian.

Meat Hygiene Seminar in Alexandria

A seminar on meat hygiene was held under the auspices of the WHO Regional Office for the Eastern Mediterranean from 4 to 23 July 1955 in Alexandria. Lectures were given at the University of Alexandria, and practical laboratory demonstrations took place at the municipal slaughterhouse.

Participants in the seminar came from Ethiopia, Iran, Iraq, Jordan, Saudi Arabia, the Sudan, and Syria, as well as from the host country, Egypt. Two special WHO consultants led the work of the seminar: Dr Aege Jepsen, of the Royal Veterinary and Agricultural College of Copenhagen, Denmark, and Dr V. E. Albertsen, Veterinary Inspector, Meat Hygiene Department of the State Veterinary Service, Copenhagen.

International Conference on Public Health

Following the Eighth World Health Assembly, an international conference on public health was held under the auspices of the U. S. National Citizens Committee for the World Health Organization, Inc., in honour of the delegations to the Assembly. This conference, described as " a series of seminar

[1] See *Chron. Wld Hlth Org.*, 1953, 7, 124.

discussions and visits to several health and medical institutions in Washington, D.C., Baltimore, and New York ", took place from 30 May to 4 June.

According to the programme, on the first day the conference participants met at the National Institutes of Health, Bethesda, Md. There were two seminar discussions: the first, of which Dr H. L. Dunn was Chairman, was on techniques of gathering, processing, and using reliable health and population statistics, and on statistical control in research work; the second, of which Dr J. W. Cronin was Chairman, had as subject the designing, equipping, and managing of hospitals and clinics.

The second day began with two meetings at Bethesda. Dr W. W. Wright was Chairman of a discussion on newer knowledge in virus and parasitic diseases. This was followed by a seminar, under the chairmanship of Dr J. M. Andrews, on new developments in insecticides and their use in area programmes. In the afternoon the conference participants visited the Johns Hopkins School of Hygiene and Public Health, in Baltimore, Md. Here there were round-table discussions on various subjects, including (1) graduate training in public health, (2) new ideas in public health administration, and (3) housing in relation to health.

The third day included travel from Baltimore to New York and an opportunity for the participants to tour the United Nations Headquarters.

The following day was devoted to discussion of a number of important public-health problems: (1) the epidemiology and prevention of poliomyelitis, with Drs T. M. Rivers, H. E. Van Riper, and Johannes Frandsen, and Professors Thomas Francis, jr, and J. E. Salk among the participants; (2) techniques of official public-health administration and voluntary agencies; (3) basic principles relating to efficient development and large-scale production of antibiotics, vaccines, and other pharmaceuticals; and (4) procedures in setting standards of safety, potency, and dosage of pharmaceuticals—problems faced in developing national pharmacopoeias—with Sir Arcot L. Mudaliar and Drs L. C. Miller, F. J. Brady, F. O. Taylor, and E. Fullerton Cook participating.

The fifth day of the conference gave participants a chance to visit various hospital centres in New York and to choose among several seminars. The topics of the day included: tuberculosis control; teaching public health to undergraduate medical students; the management of banks for blood, corneae, and aortae; the control of world-wide influenza epidemics; nutrition; relations among insect-borne viruses, the yellow fever threat, and rabies control, these three subjects being discussed by Drs G. K. Strode, Hilary Koprowski, F. L. Soper, and Max Theiler; and mental health programmes, with Drs F. Fremont-Smith, H. Brill, J. R. Rees, and G. S. Stevenson, and Professors S. Z. Levine and P. V. Lemkau as participants.

On the final day, a seminar on the control of cancer was held at the Memorial Center for Cancer and Allied Diseases. The last discussion was on developments in physical medicine and rehabilitation services and took place at the Institute of Physical Medicine and Rehabilitation of the New York University-Bellevue Medical Center.

This international health conference enjoyed the participation and assistance of a wide variety of organizations and companies.

THE UGLY SORE ON THIS LEG FORETELLS A LIFE-TIME OF PAIN

Yaws is a disease widespread throughout the tropical regions. It is usually contracted in childhood and lasts a life-time. If untreated the sores spread and in time the disease eats away flesh, attacks bones, disfigures, and deforms.

The above is from the first World Health Organization picture set (WHO Picture Set 1), produced to meet an increasing demand for a light, inexpensive exhibit on the aims and work of WHO.

The picture set is entitled " Health Is a Fundamental Human Right " and deals, in 16 separate panels, with some aspects of WHO's work. The subjects include nutrition, poliomyelitis, maternal and child health, midwifery training, public health nursing, school health services, endemic syphilis, anti-yaws campaigns, malaria control, bilharziasis control, water sanitation, and the care of premature infants. The panels are 14 in. by 20 in. (35 cm by 50 cm) in size, offset printed on heavy poster paper, and suitable for tacking or fixing on walls or bulletin boards for display.

The set is available with English, French, Spanish, German, or Arabic text; there is also a limited number in Danish and Norwegian. It may be obtained on request from the public information officers of the WHO Regional Offices.

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